



**SLOVENSKI STANDARD**  
**SIST EN 12836:2002**

**01-september-2002**

**BUXca Yý U**  
**SIST ENV 12836:2001**

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Surface active agents - Determination of the water number of alkoxyated products

Grenzflächenaktive Stoffe - Bestimmung der Wasserzahl von alkoxylierten Produkten

Agents de surface - Détermination du nombre d'eau dans les produits alkoxylés  
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**Ta slovenski standard je istoveten z: ~~SIST EN 12836:2001~~ EN 12836:2002**

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**ICS:**

71.100.40 Površinsko aktivna sredstva Surface active agents

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**en**

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EUROPEAN STANDARD

**EN 12836**

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2002

ICS 71.100.40

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English version

## Surface active agents - Determination of the water number of alkoxyated products

Agents de surface - Détermination du nombre d'eau dans les produits alkoxylés

Grenzflächenaktive Stoffe - Bestimmung der Wasserzahl von alkoxylierten Produkten

This European Standard was approved by CEN on 3 January 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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## Contents

	page
Foreword.....	3
Introduction .....	4
1 Scope .....	5
2 Normative references .....	5
3 Term and definition.....	5
4 Principle .....	5
5 Reagents .....	5
6 Apparatus .....	6
7 Preparation of test sample.....	6
8 Procedure .....	6
9 Expression of results .....	7
10 Precision .....	7
11 Test report .....	7
Annex A (informative) Interlaboratory test results.....	8
Bibliography .....	9

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[SIST EN 12836:2002](https://standards.iteh.ai/catalog/standards/sist/1664e75b-0fce-4bb2-baef-bcf0ab2ccc63/sist-en-12836-2002)

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## Foreword

This document EN 12836:2002 has been prepared by Technical Committee CEN/TC 276 "Surface active agents", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2002, and conflicting national standards shall be withdrawn at the latest by September 2002.

This document supersedes ENV 12836:1999.

Significant technical differences between this standard and ENV 12836:1999 are the deletion of annexes B and C and the modification of annex A relating of precision data.

Annex A is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## Introduction

H.L. Greenwald, G.L. Brown and M.N. Fineman [1] and W.C. Griffin [2] proposed the so-called water number as an easy-to-measure criterion for the hydrophilic-lipophilic-balance (HLB) value of surface active agents and oils. The method described was based on a dioxane/benzene mixture. In the following test method noxious benzene has been replaced by toluene. The water number is not altered by this change.

It is also possible to replace dioxane with triethylene glycol dimethyl ether. This, however, results in a change in the absolute numerical value of the water number, especially for high molecular mass nonionics (for example ethylene oxide/propylene oxide (EO/PO) block polymers).

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## 1 Scope

This European Standard specifies the determination of the water number of ethoxylated products up to about 70 % ethylene oxide. EO/PO block polymers with water numbers higher than about 23 become hard to interpret.

NOTE The values obtained by this method are not completely identical with the water number obtained in dioxane, in particular water numbers higher than 23.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN ISO 3696, *Water for analytical laboratory use – Specification and test methods (ISO 3696:1987)*.

EN ISO 4320, *Non-ionic surface active agents - Determination of cloud point index - Volumetric method (ISO 4320:1977)*.

## 3 Term and definition

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For the purposes of this European Standard, the following term and definition apply.

### 3.1

#### water number

number of millilitres of water required to bring about a persistent turbidity in a solution with a specified volume of a solvent mixture at a constant temperature

SIST EN 12836:2002

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NOTE Results of water numbers are very sensitive to temperature deviations.

## 4 Principle

To a solvent mixture consisting of dioxane/toluene (or triethylene glycol dimethyl ether/toluene) in which the sample is dissolved to give a clear solution, water is added at a temperature of  $(25 \pm 1)$  °C until a persistent turbidity appears.

## 5 Reagents

All reagents shall be of a recognized analytical grade and the water used shall conform to grade 3, in accordance with EN ISO 3696.

**5.1 Solvent mixture**, with a mass fraction of 97,0 % dioxane and 3,0 % toluene.

NOTE If dioxane is not wanted or cannot be used, it may be replaced by triethylene glycol dimethyl ether (purity  $\geq 98$  %).

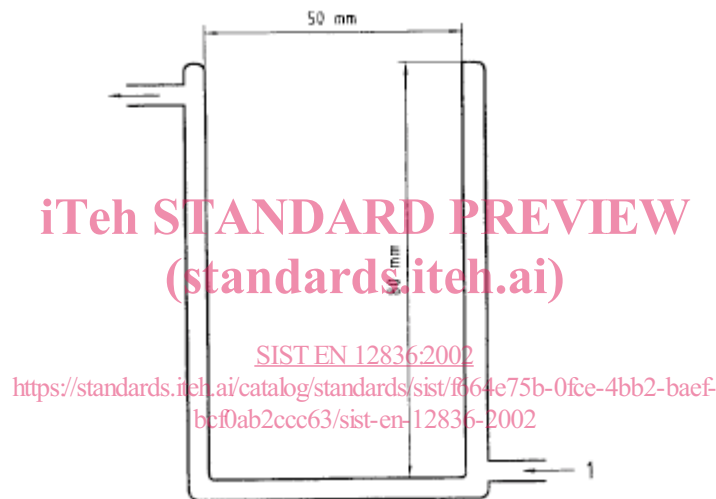
## EN 12836:2002 (E)

## 6 Apparatus

Ordinary laboratory apparatus and the following :

- 6.1 100 ml conical flask with glass stopper.
- 6.2 2 x 50 ml semi-microburettes or thermostatable (double-walled) titration equipment.
- 6.3 Double-walled beaker (see Figure 1).
- 6.4 Thermostat with circulating pump, adjustable to  $\pm 0,1$  °C.
- 6.5 Analytical balance, accurate to  $\pm 0,01$  g.
- 6.6 Magnetic stirrer.

Dimensions in millimetres



### Key

- 1 Direction of water circulation

Figure 1 — Double-walled beaker in accordance with EN ISO 4320

## 7 Preparation of test sample

For the determination of the water number, 100 % active substance shall be used. If the sample contains solvent, it shall be completely removed (by distillation for example rotating evaporation).

## 8 Procedure

### 8.1 Dissolution of the sample

Weigh  $(1,00 \pm 0,01)$  g of substance (sample) into a dry flask (6.1) with ground glass joint or directly into the double-walled beaker (6.3). Into this flask or beaker pour 30,0 ml of solvent mixture (5.1) from a 50 ml semi-microburette (6.2) whose storage bottle stands in a thermostated bath at  $(25 \pm 1)$  °C. When using a conical flask with a ground glass joint close it with a glass stopper and dissolve the sample, if necessary by heating slightly and briefly. The temperature to stabilize at  $(25 \pm 1)$  °C.



## 8.2 Determination of water number

Pour the clear solution into the double-walled beaker (6.3), maintained at  $(25 \pm 1) ^\circ\text{C}$ , stir with magnetic stirrer (6.6), covered with a polyethylene cover and drop in water at a rate of 1 ml/min to 2 ml/min from a second semi-microburette (6.2), whose storage bottle also stands in a thermostated bath at  $(25 \pm 1) ^\circ\text{C}$ , until turbidity persists for 2 min.

## 9 Expression of results

Report the result as the mean of two titrations calculated to the nearest 0,1 ml.

## 10 Precision

### 10.1 Repeatability

The absolute difference between two independent single test results, obtained using the same method on identical test material in the same laboratory by the same operator using the same equipment within a short interval of time, will not exceed the repeatability limit,  $r$ , in more than 5 % of cases.

Typical precision data obtained in a ring test are given in annex A.

### 10.2 Reproducibility

The absolute difference between two independent single test results, obtained using the same method on identical test material in different laboratories by different operators using different equipment, will not exceed the reproducibility limit,  $R$ , in more than 5 % of cases.

Typical precision data obtained in a ring test are given in annex A.

## 11 Test report

The test report shall include the following information :

- a) all information necessary for the complete identification of the sample ;
- b) a reference to this European Standard ;
- c) the method and the solvent used (dioxane or triethylene glycol dimethyl ether) ;
- d) the test results ;
- e) the test date ;
- f) details of any operations not specified in this European Standard and any operations regarded as optional, as well as any incidents which may have influenced the results.